Journal of Organizational and End User Computing
Volume 34 • Issue 8

Research on Decision-Making Based on the Three-Party Evolutionary Game of Tourists, Scenic Spots, and Government

Xincai Ye, Huaqiao University, China

Lin Miao, Liming Vocational University, China*

https://orcid.org/0000-0003-2971-5037

ABSTRACT

The continuous upsurge of tourism consumption activities has promoted economic development, but at the same time, it has also produced numerous problems, such as low-quality service and high admission prices at scenic spots, which are not conducive to the sustainable development of tourism. In this paper, in view of the phenomenon of low-quality service of scenic spots, a three-party evolutionary game model of scenic spots, tourists, and government is constructed under the participation of tourists and the reward-subsidy mechanism and punishment mechanism, and a simulation analysis is performed using the NetLogo platform. The results show that, under the reward-subsidy and punishment mechanisms, the service strategy selection of scenic spots will eventually evolve to provide high-quality services, tourists will eventually choose the no-complaint strategy, and the government will eventually evolve to provide active supervision.

KEYWORDS

Evolutionary Game, Government Regulation, NetLogo Simulation, Reward and Punishment Mechanism, Scenic Spot Quality and Service,

LITERATURE REVIEW

In recent years, scholars around the world have studied tourism operation and tourism market supervision, and achieved many promising results. Evolutionary game theory analyzes the behaviors of participants in the tourism industry from the perspective of stakeholders (Barari et al., 2012). In the tourism industry, stakeholders include individuals, groups, and organizations, such as tourists, tourism enterprises, local communities, and governments (Baggio et al., 2010). The development of tourism cannot be separated from the participation of stakeholders (Waligo et al., 2015), especially when facing major public crises.

By building a cross-border tourism supply-chain model, Tsaur and Chen (2018) found that the imbalance among the commission, local tour fees, and government supervision costs between the travel agency and the local scenic spots, was the key to the low-cost tour. Yan et al. (2021) analyzed the behavioral interaction and game equilibrium of stakeholders in tourism development by constructing an evolutionary game model among the government, tourists, and tourism enterprises, and discussed

DOI: 10.4018/JOEUC.315315

*Corresponding Author

the influence of different evolutionary paths and main parameters on strategic choices of stakeholders (Yan et al., 2021).

Huang et al. (2019) studied the generation of green behaviors of tourism enterprises in the process of developing a green tourism supply chain by using evolutionary game theory. Model derivation and simulation data analysis showed that most of the tourism enterprises are indeed motivated to engage in green development, and the formation of a green tourism supply chain is a dynamic evolution process (Huang et al., 2019). Asero et al. (2017) used the game theory model to explain the decision-making process of entrepreneurs in establishing partnerships in the formal tourism network. The research results show that in the Nash equilibrium model, when entrepreneurs have the same business objectives and common tourism vision, the cooperative optimization of a tourism network can be achieved (Asero et al., 2017).

K. Sun et al. (2021), by using evolutionary game theory, has constructed an evolutionary game model composed of three stakeholders: enterprises, tourists and government, replicated the dynamic equation, describing the evolution of the three parties' operating process, and analyzed the stability of the interaction between stakeholders to determine the bounded rationality of the equilibrium solution. Operation evolution game theory analyzes the dynamic relationship between the tourism scene and the user's experience, and introduces word-of-mouth as a research parameter to evolve different decisions of tourism enterprise development through the change of user word-of-mouth (Ma & Ding, 2018).

P. He et al. (2018) explored the effective green incentive mechanism for the government to develop traditional tourism into green tourism by establishing a dynamic evolutionary game model among the government, tourism enterprises, and tourists. The evolutionary stabilization strategy (ESS) of Green innovation, and its corresponding conditions for each stakeholder, was discussed, the ESS between tourism enterprises and tourists was analyzed, and the government's Green regulation was considered. In addition, tourists' complaints sometimes generate public opinion in social groups.

Gang & Chenglin (2021) dynamically measured and evaluated hotel customer satisfaction through the emotional analysis of online comments. Ng et al. (2021) conducted product satisfaction evaluation through emotional analysis, and showed that tourists' emotional dynamic comments have an impact on scenic spots and government decision-making strategies.

Blanco et al. (2009) used the evolutionary game model of tourism companies to determine the relationship between Green companies and regulations. Qingyun, P et al. (2021) explored the dynamic nature and stability of land income distribution in tourism development by building three major stakeholders, including the government, developers, and local communities. The research results showed that the land income-distribution process is deeply affected by the means of land transfer. Based on the concept of sustainable development, Chica, M et al. (2022) proposed an asymmetric evolutionary game with mobility. In this game, local stakeholders and tourists can either cooperate or fail in the environment of spatial structure. Research shows that sustainable tourism is mainly determined by the best trade-off between the economic benefits of stakeholders and the costs related to the application of sustainable policies. Lv et al. (2022) used evolutionary games and stochastic processes to test the variance of travel group quality under different information conditions, and provided a basis for the formation and evolution of travel-group supply strategies. Research results showed that when the market information is symmetric, the elasticity of demand is crucial to the quality of travel groups. In the tourism market with asymmetric information, adverse selection and moral hazard are the main reasons for the decline of package tourism quality (Lv et al., 2022).

In summary, the previous studies mainly made important contributions to tourism service regulation and gave some practical governance suggestions, but they could be further improved in the following respects:

1. In terms of research methods, most studies have mainly focused on qualitative research, and a small number of scholars use the method of game theory, but most are based on the assumption of complete rationality and complete information (Cristofaro et al., 2020; University of Warsaw

et al., 2019). Compared with traditional game theory, evolutionary game is based on the bounded rationality of decision makers, and does not require complete information conditions. Therefore, facing the characteristics of asymmetric information in the tourism market, evolutionary game is more consistent with the reality to analyze the behavior of decision makers (Arbara & D'Autilia, 2021).

2. As for government supervision, most existing studies suggest increasing punishment. Although this can improve the problem of low-quality service of scenic spots to a certain extent, increasing punishment will cause scenic spot managers to become more cautious, thus increasing the difficulty of government investigation and punishment (Wang et al., 2022). In addition, at present, government subsidies are mostly used in green tourism (Zhao & Chen, 2022), ecological tourism (Y. Sun et al., 2021; Zhao et al., 2022), and low-carbon tourism (Xu et al., 2015; Zhang & Zhang, 2020) in tourism industry supervision, and there have been few studies on the quality service of supervision scenic spots. Government subsidies can play a positive guiding role in the supervision of quality services of scenic spots (Zhang & Yang, 2019), helping to solve the problem of "bad money driving out good money" in the tourism market (Chang & Seow, 2019).
3. Most studies take travel agencies as the supervision objects of quality services (Dai et al., 2019), while few use scenic spots. However, the low-quality service of scenic spots is the key subject leading to the poor consumption experience of tourists, thus it is a more targeted approach to take scenic spots as the key subject of the quality service game.

Based on this, this study introduces two variables (government subsidy and tourist complaint reward) on the basis of the previous punishment mechanism, and constructs a dynamic model of the tripartite evolutionary game among the scenic area, tourists, and the government, under the participation of tourists. The multi-agent simulation platform NetLogo is used for simulation analysis. To perform punishment and award mechanism analysis of the similarities and differences in the governance effects in the simulation analysis section, this paper focuses on the interplay between the behavior of the evolutionary game with four variables: government's penalties on the scenic area, the level of the compensation of the scenic spot for tourists, government subsidies to the scenic spot, and government incentives to complaints of tourists. The research framework of this paper is as follows: First is the construction of the three-party evolutionary game model. Then the stability analysis of the three-way evolutionary game is presented. The next section carries out numerical simulation, and compares and analyzes the three-party game decision under different situations. The final section is the conclusion.

CONSTRUCTION OF A THREE-PARTY EVOLUTIONARY GAME MODEL

Basic Assumptions

Hypothesis 1: Scenic spots, tourists, and the government are under the condition of incomplete information, and are bounded and rational.

Hypothesis 2: The strategic space of the scenic spot is {high tourism quality service, low-quality service}. Under high tourism quality service, the scenic spot will increase the investment of human resources, materials, and other resources at the scenic spot. Under the condition of low tourism quality service, the scenic spots will continuously invest fewer service resources to reduce costs. The strategic space of tourists is {no complaint, complaint}. When tourists are satisfied with the quality service of scenic spots, they generally will not choose to complain, but sometimes they will complain about scenic spots that provide high-quality service due to cognitive bias. When tourists are highly dissatisfied with the quality service of scenic spots, they will choose to complain to the government departments, but sometimes they will choose not to complain so as to avoid trouble. The strategic space of the government is {regulation, no regulation}. If the government chooses regulation, then the government will definitely punish the tourists who complain; if the tourists do not complain, then the probability of successful investigation and punishment is ω $\left(0 \leq \omega \leq 1\right)$ (Theodoulidis et al., 2017).

Hypothesis 3: For scenic spots, if they choose to provide high-quality services, the income of the scenic spots is R_1, and the cost of input c_1 will be higher. In this case, since the scenic area's high-quality services improve the local tourism business environment and increase local economic income, the government will give the upper limit of subsidy *S*, and the subsidy intensity is θ $\left(0 \leq \alpha \leq 1\right)$. Of course, there are also negative impacts caused by tourists' erroneous complaints about the scenic area, resulting in a reduction in the number of tourists, and the potential loss is d_1. If the low-quality service R_2 is selected, the revenue of the scenic spot is c_2, and the input cost is $\left(c_1 - c_2\right)$. When the scenic spot reduces the service input to save costs, it will face the risk of being complained about by tourists and punished by the government. If it is investigated, the scenic spot will require the tourists to compensate, the compensation being $\alpha\left(c_1 - c_2\right)$ $\left(0 \leq \alpha \leq 1\right)$ and the government fine being $\beta\left(c_1 - c_2\right)$ $\left(0 \leq \beta \leq 1\right)$. In turn, the tourist complaints will increase, leading to a large reduction in passenger flow, and the loss is d_2. According to the reality $c_1 > c_2$, $R_1 > R_2$, $R_2 + \left(c_1 - c_2\right) > R_1$, $d_1 < d_2$.

Hypothesis 4: For tourists, if they visit a scenic spot with high-quality services, their basic consumption includes ticket fees m_1 and voluntary normal consumption $m_1^{'}$ while visiting (shopping, entertainment, etc.). If tourists encounter a scenic spot with low-quality services, their basic consumption includes gate fees m_2, voluntary and normal consumption $m_2^{'}$ (shopping, entertainment, etc.), and some compulsory consumption μ. When visiting a scenic spot with poor service quality, tourists can choose to either make a complaint or not. If they complain, they must pay the relevant fees t in the complaint process (the complaint fee consists of legal costs, transportation costs, missed work fees, etc.). When the government receives complaints from tourists and attends to them immediately, tourists can not only receive the compensation given by the scenic spot $\alpha\left(c_1 - c_2\right)$, but also receive the upper limit J of the government's reward for actively supervising the scenic spot, and the compensation strength is γ.

Hypothesis 5: For the government, if it chooses regulatory strategies, it will need to pay regulatory costs g, including law enforcement costs, personnel salaries, etc. Strong supervision can create a good tourism environment for the local area and improve the local tourism image, and thus obtain more economic and social benefits X_1. If the government chooses not to supervise the strategy, then it will not have to pay the supervision cost, but the local tourism image will be harmed due to a large number of tourist complaints. The tourist flow will continue to decrease, the tourism income will be reduced and, in turn, the economic and social benefits will be reduced to X_2.

Payment Matrix and Strategy Combination

If the proportion of scenic spots choosing high-quality service strategies is x, then the proportion of choosing low-quality service strategies is $1 - x$. If the proportion of tourists choosing complaint strategy is y, the proportion of tourists choosing no complaint strategy is $1 - y$. If the proportion of the government chooses the regulatory strategy is z, the proportion of the government choosing the non-regulatory strategy is $1 - z$, $x, y, z \in \left[0,1\right]$ (Todd et al., 2017).

According to the selection strategies of the above three parties, a total of eight strategy combinations can be formed. The details of each combination are as follows:

Strategy combination 1: Scenic spots provide high-quality services, tourists complain, government regulation, the strategy selection is $\left(x, y, z\right)$.

Strategy combination 2: Scenic spots provide high-quality services, tourists complain, no government regulation, the strategy selection is $\left(x, y, 1-z\right)$.

Strategy combination 3: Scenic spots provide high-quality services, tourists do not complain, government regulation, the strategy selection is $\left(x, 1-y, z\right)$.

Strategy combination 4: Scenic spots provide high-quality services, tourists do not complain, no government regulation, the strategy selection is $\left(x, 1-y, 1-z\right)$.

Strategy combination 5: Scenic spots provide low-quality services, tourists complain, government regulation, the strategy selection is $\left(1-x, y, z\right)$.

Strategy combination 6: Scenic spots provide low-quality services, tourists complain, no government regulation, the strategy selection is $\left(1-x, y, 1-z\right)$.

Strategy combination 7: Scenic spots provide low-quality services, tourists do not complain, government regulation, the strategy selection is $\left(1-x, 1-y, z\right)$.

Strategy combination 8: Scenic spots provide low-quality services, tourists do not complain, no government regulation, the strategy selection is $\left(1-x, 1-y, 1-z\right)$.

Based on the above assumptions, the payment matrix of the three-party evolutionary game of scenic spots, tourists, and government can be obtained as shown in Table 1.

Table 1. Evolution Game Payment Matrix of Scenic Spots, Tourists and Government

Strategy Combination	Scenic Spots Income	Tourists Income	Government Income
(High-quality service, complaints, regulation)	$R_1 - c_1 - d_1 + \theta S$	$-m_1 - m_1^{'} - t$	$X_1 - g - \theta S$
(High-quality service, complaints, no regulation)	$R_1 - c_1 - d_1$	$-m_1 - m_1^{'} - t$	X_2
(High-quality service, no complaints, regulation)	$R_1 - c_1 + \theta S$	$-m_1 - m_1^{'}$	$X_1 - g - \theta S$
(High-quality service, no complaints, no regulation)	$R_1 - c_1$	$-m_1 - m_1^{'}$	X_2
(Low-quality service, complaints, regulation)	$R_2 - c_2 - \alpha\left(c_1 - c_2\right)$ $-\beta\left(c_1 - c_2\right) - d_2$	$-m_2 - m_2^{'} - \mu - t$ $+\alpha\left(c_1 - c_2\right) + \gamma J$	$X_1 + \beta\left(c_1 - c_2\right)$ $-g - \gamma J$
(Low-quality service, complaint, no regulation)	$R_2 - c_2 - d_2$	$-m_2 - m_2^{'} - \mu - t$	X_2
(Low-quality service, no complaints, regulation)	$R_2 - c_2 - \omega\beta\left(c_1 - c_2\right)$	$-m_2 - m_2^{'} - \mu$	$X_1 + \omega\beta\left(c_1 - c_2\right) - g$
(Low-quality service, no complaints, no regulation)	$R_2 - c_2$	$-m_2 - m_2^{'} - \mu$	X_2

Payment Matrix Solution

Expected benefits of the scenic spots from the selection of high-quality service:

$$E_{11} = -yd_1 + z\theta S + R_1 - c_1 \tag{1}$$

Expected benefits of the scenic spots from the selection of low-quality service:

$$E_{12} = -yz\alpha\left(c_1 - c_2\right) - yz\beta\left(1-\omega\right)\left(c_1 - c_2\right) - yd_2 - z\omega\beta\left(c_1 - c_2\right) + \left(R_2 - c_2\right) \tag{2}$$

Average expected income of scenic spots:

$$E_1 = xE_{11} + \left(1-x\right)E_{12} \tag{3}$$

Scenic spots' replication dynamic equation:

$$\begin{aligned} F(x) &= \frac{dx}{dt} = x\left(E_{11} - E_1\right) = x\left(1-x\right)\left(E_{11} - E_{12}\right) \\ &= x(1-x)\Big(-yd_1 + z\theta S + R_1 - c_1 + yz\alpha\left(c_1 - c_2\right) \\ &+ yz\beta\left(1-\omega\right)\left(c_1 - c_2\right) + yd_2 + z\omega\beta\left(c_1 - c_2\right) - \left(R_2 - c_2\right)\Big) \end{aligned} \tag{4}$$

Expected benefits of tourists choosing to complain:

$$E_{21} = x\left(-m_1 - m_1^{'} - t\right) + \left(1-x\right)z\left(\alpha\left(c_1 - c_2\right) + \gamma J\right) + \left(1-x\right)\left(-m_2 - m_2^{'} - \mu - t\right) \tag{5}$$

Expected benefits of tourists choosing not to complain:

$$E_{22} = x\left(-m_1 - m_1^{'}\right) + \left(1-x\right)\left(-m_2 - m_2^{'} - \mu\right) \tag{6}$$

Average expected return for tourists:

$$E_2 = yE_{21} + \left(1-y\right)E_{22} \tag{7}$$

Tourist's replication dynamic equation:

$$\begin{aligned} G\left(y\right) &= \frac{dy}{dt} = y\left(E_{21} - E_2\right) = y\left(1-y\right)\left(E_{21} - E_{22}\right) \\ &= y\left(1-y\right)\Big(\left(1-x\right)z\left(\alpha\left(c_1 - c_2\right) + \gamma J\right) - t\Big) \end{aligned} \tag{8}$$

Expected benefits of government regulation:

$$E_{31} = x\left(-\theta S - \omega\beta\left(c_1 - c_2\right)\right) + \left(1 - x\right)y\left(\left(1 - \omega\right)\beta\left(c_1 - c_2\right) - \gamma J\right) + \left(X_1 + \omega\beta\left(c_1 - c_2\right) - g\right) \tag{9}$$

Expected benefits the government choosing not to regulate:

$$E_{32} = X_2 \tag{10}$$

Average expected return of the government:

$$E_3 = zE_{31} + \left(1 - z\right)E_{32} \tag{11}$$

Government's replication dynamic equation:

$$H(z) = \frac{dz}{dt} = z\left(E_{31} - E_3\right) = z\left(1 - z\right)\left(E_{31} - E_{32}\right) = z(1 - z)\left(x\left(-\theta S - \omega\beta\left(c_1 - c_2\right)\right) + \left(1 - x\right)y\left(\left(1 - \omega\right)\beta\left(c_1 - c_2\right) - \gamma J\right) + \left(X_1 + \omega\beta\left(c_1 - c_2\right) - g\right) - X_2\right) \tag{12}$$

STABILITY ANALYSIS OF THE THREE-PARTY EVOLUTION GAME

Equilibrium Point Solution of the Evolution Game

A joint construct equation is used to solve the equilibrium point of the evolution game:

$$\begin{cases} F\left(x\right) = 0 \\ G\left(y\right) = 0 \\ H\left(z\right) = 0 \end{cases} \tag{13}$$

In Equation (13), in the solution domain $R = \left\{\left(x, y, z\right) \middle| 0 \le x \le 1, 0 \le y \le 1, 0 \le z \le 1\right\}$, there are eight equilibrium solutions: (0,0,0), (1,0,0), (0,1,0), (0,0,1), (1,1,0), (1,0,1), (0,1,1), (1,1,1). Therefore, the domain is the equilibrium solution of the three-party evolution game. In most cases, the optimal solution $\left(x^*, y^*, z^*\right)$ is also in the above solution, and satisfies the following formula:

$$\begin{cases} -yd_1 + z\theta S + R_1 - c_1 + yz\alpha\left(c_1 - c_2\right) + yz\beta\left(1 - \omega\right)\left(c_1 - c_2\right) + yd_2 + z\omega\beta\left(c_1 - c_2\right) - \left(R_2 - c_2\right) = 0 \\ \left(1 - x\right)z\left(\alpha\left(c_1 - c_2\right) + \gamma J\right) - t = 0 \\ x\left(-\theta S - \omega\beta\left(c_1 - c_2\right)\right) + \left(1 - x\right)y\left(\left(1 - \omega\right)\beta\left(c_1 - c_2\right) - \gamma J\right) + \left(X_1 + \omega\beta\left(c_1 - c_2\right) - g\right) - X_2 = 0 \end{cases} \tag{14}$$

Stability Analysis of the Evolutionary Game

The replication dynamic equations of Equations (4), (8), and (12) are respectively derived as follows:

$$F'\left(x\right) == \left(1-2x\right) \begin{pmatrix} y\left(d_2-d_1\right)+R_1-c_1+yz\left(\alpha\left(c_1-c_2\right)+\beta\left(1-\omega\right)\left(c_1-c_2\right)\right) \\ +z\left(\omega\beta\left(c_1-c_2\right)+\theta S\right)-\left(R_2-c_2\right) \end{pmatrix} \tag{15}$$

$$G'\left(y\right)=\left(1-2y\right)\left(\left(1-x\right)z\left(\alpha\left(c_1-c_2\right)+\gamma J\right)-t\right) \tag{16}$$

$$H'\left(z\right)=\left(1-2z\right) \begin{pmatrix} x\left(-\theta S-\omega\beta\left(c_1-c_2\right)\right)+\left(1-x\right) \\ y\left(\left(1-\omega\right)\beta\left(c_1-c_2\right)-\gamma J\right)+\left(X_1+\omega\beta\left(c_1-c_2\right)-g\right)-X_2 \end{pmatrix} \tag{17}$$

According to the evolutionary game theory, when $F'\left(x\right)<0$, $G'\left(x\right)<0$, $H'\left(x\right)<0$, $\left(x^*,y^*,z^*\right)$ is a three-party evolution game stability strategy for local connections, tourists, and the government (Lv et al., 2022).

Progressive Stability Analysis of the Scenic Spots

The reason why the scenic spots choose low-quality services is that by reducing the service expenditures can save costs and increase profits, so it can be obtained according to the reality $\left(d_2-d_1\right)+R_1-c_1-\left(R_2-c_2\right)>0$.

In Equation (15), the following are true.

If:

$$z=\frac{y\left(d_2-d_1\right)+R_1-c_1-\left(R_2-c_2\right)}{y\left(\alpha\left(c_1-c_2\right)+\beta\left(1-\omega\right)\left(c_1-c_2\right)\right)+\left(\omega\beta\left(c_1-c_2\right)+\theta S\right)}$$

then $F\left(x\right)\equiv 0$. At this time, all levels are in a stable state, and the strategy choice of the scenic spot will not change with time.

If:

$$z>\frac{y\left(d_2-d_1\right)+R_1-c_1-\left(R_2-c_2\right)}{y\left(\alpha\left(c_1-c_2\right)+\beta\left(1-\omega\right)\left(c_1-c_2\right)\right)+\left(\omega\beta\left(c_1-c_2\right)+\theta S\right)}$$

then $F'\left(x\right)\Big|x=0>0$ and $F'\left(x\right)\Big|x=1<0$. $x=1$ is the stable point, and scenic spots choose to provide high-quality service strategy.

If:

$$z < \frac{y\left(d_2 - d_1\right) + R_1 - c_1 - \left(R_2 - c_2\right)}{y\left(\alpha\left(c_1 - c_2\right) + \beta\left(1 - \omega\right)\left(c_1 - c_2\right)\right) + \left(\omega\beta\left(c_1 - c_2\right) + \theta S\right)}$$

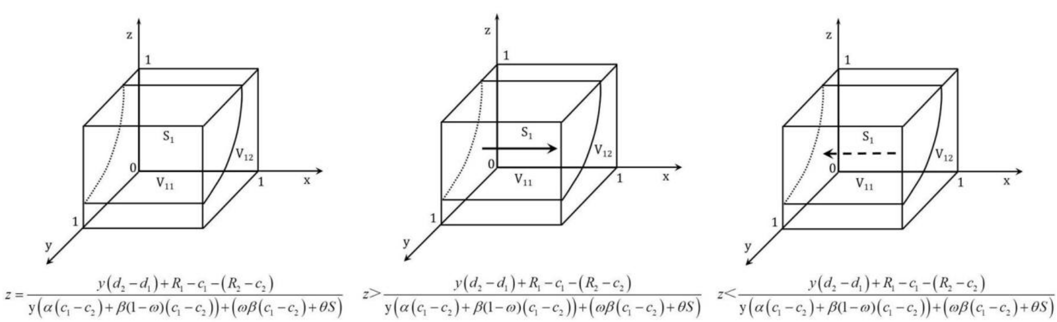
then $F'\left(x\right)\Big|x = 0 < 0$ and $F'\left(x\right)\Big|x = 1 > 0$. $x = 0$ is the stable point, and scenic spots choose to provide low-quality services strategy.

If $x \in \left(0,1\right)$ and $F\left(x\right) > 0$, then its evolutionary stability depends on the form of:

$$y\left(d_2 - d_1\right) + R_1 - c_1 + yz\left(\alpha\left(c_1 - c_2\right) + \beta\left(1 - \omega\right)\left(c_1 - c_2\right)\right)$$
$$+z\left(\omega\beta\left(c_1 - c_2\right) + \theta S\right) - \left(R_2 - c_2\right) = 0$$

According to the above analysis process, the dynamic trend map of the scenic spots' evolution can be drawn as shown in Figure 1. The three-dimensional space is $M = \left\{D\left(x,y,z\right)\Big|0 \le x \le 1, 0 \le y \le 1, 0 \le z \le 1\right\}$. The curved surface S_1 divides space M into the upper V_{11} and lower parts V_{12}. When the initial state of the game is in space V_{11}, the scenic spot eventually evolves to choosing to provide a high-quality service level. When the initial state of the game is located in space V_{12}, then the scenic spot eventually evolves to choosing to provide a low-quality service level.

Figure 1. Dynamic Trend Diagram of the Scenic Spots' Evolution



Asymptotic Stability Analysis of Tourists

Similarly, according to Equation (16), the following are true.

If $z = \frac{t}{\left(1 - x\right)\left(\alpha\left(c_1 - c_2\right) + \gamma J\right)}$, then $G\left(x\right) \equiv 0$. The level is all stable state, and the strategy choice of the scenic spot will not change with time.

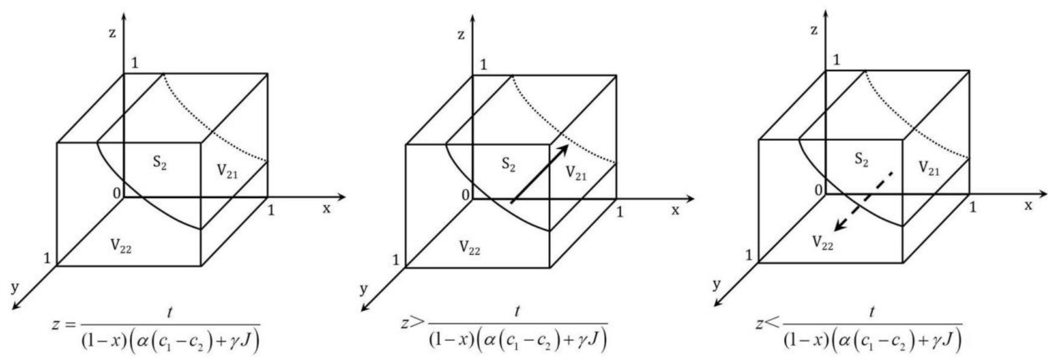
If $\alpha\left(c_1 - c_2\right) + \gamma J > t$, it can be discussed in the following two situations:

- If $z > \dfrac{t}{\left(1-x\right)\left(\alpha\left(c_1 - c_2\right) + \gamma J\right)}$, then $G'\left(y\right)\big|y = 0 > 0$, $G'\left(y\right)\big|y = 1 < 0$. $y = 1$ is the evolutionary stability point, tourists will choose to complain about the behavior strategy.
- If $z < \dfrac{t}{\left(1-x\right)\left(\alpha\left(c_1 - c_2\right) + \gamma J\right)}$, then $G'\left(y\right)\big|y = 0 < 0$ and $G'\left(y\right)\big|y = 1 > 0$. $y = 0$ is the evolutionary stability point, tourists will choose to not complain about the behavior strategy.

If $y \in \left(0,1\right)$ and $G\left(y\right) > 0$, then the evolutionary stability depends on the morphology of $\left(1-x\right)z\left(\alpha\left(c_1 - c_2\right) + \gamma J\right) - t = 0$.

According to the above analysis process, the dynamic trend map of the tourists' evolution can be drawn, as shown in Figure 2. The curved surface S_2 divides space M into the upper V_{21} and lower parts V_{22}. When the initial state of the game is in space V_{21}, then tourists eventually evolve to choose to complain. When the initial state of the game is located in space V_{22}, then tourists eventually evolve to choose not to complain.

Figure 2. Dynamic Trend Diagram of Tourist Evolution



Progressive Stability Analysis of the Government

Similarly, according to Equation (17), the following are true:

If:

$$x = \frac{\theta S + \omega\beta\left(c_1 - c_2\right)}{y\left(\left(1-\omega\right)\beta\left(c_1 - c_2\right) - \gamma J\right) + \left(X_1 + \omega\beta\left(c_1 - c_2\right) - g\right) - X_2}$$

then $H\left(z\right) \equiv 0$. All parts are in a steady state, and the government's strategy choices do not alter with the changes.

When $\theta S + \omega\beta\left(c_1 - c_2\right) > 0$, it can be discussed in the following two situations:

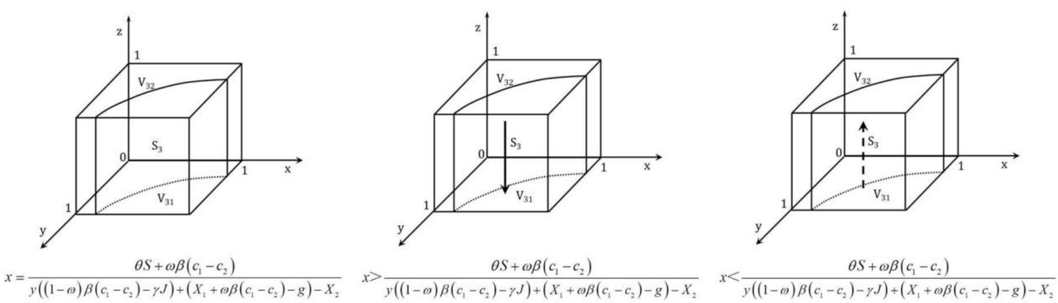
- If $x > \dfrac{\theta S + \omega\beta\left(c_1 - c_2\right)}{y\left(\left(1-\omega\right)\beta\left(c_1 - c_2\right) - \gamma J\right) + \left(X_1 + \omega\beta\left(c_1 - c_2\right) - g\right) - X_2}$, then $H'\left(z\right)\big|z = 0 > 0$ and $H'\left(z\right)\big|z = 1 < 0$. $z = 1$ is an evolutionary stability point, and the government will choose a regulatory strategy.
- If $x < \dfrac{\theta S + \omega\beta\left(c_1 - c_2\right)}{y\left(\left(1-\omega\right)\beta\left(c_1 - c_2\right) - \gamma J\right) + \left(X_1 + \omega\beta\left(c_1 - c_2\right) - g\right) - X_2}$, then $H'\left(z\right)\big|z = 0 < 0$ and $H'\left(z\right)\big|z = 1 > 0$. $z = 0$ is an evolutionary stability point, and the government will not choose a regulatory strategy.

If $z \in \left(0,1\right)$, then $H\left(z\right) > 0$. The evolutionary stability depends on the morphology of:

$$x\left(-\theta S - \omega\beta\left(c_1 - c_2\right)\right) + \left(1-x\right)y\left(\left(1-\omega\right)\beta\left(c_1 - c_2\right) - \gamma J\right)$$
$$+\left(X_1 + \omega\beta\left(c_1 - c_2\right) - g\right) - X_2 = 0$$

According to the above analysis process, the dynamic trend map of the government evolution can be drawn as shown in Figure 3. The curved surface S_3 divides space M into the upper V_{31} and lower parts V_{32}. When the initial state of the game is in space V_{31}, the government eventually evolves to choose to provide a regulatory strategy. When the initial state of the game is located in space V_{32}, the government eventually evolves into a strategy of unregulation.

Figure 3. Dynamic Trend Diagram of Government Evolution



NUMERICAL SIMULATION

To verify the accuracy of the conclusion of the evolutionary game and show the influence of the change of each parameter on the evolution trend more intuitively, this paper assigns the value of each parameter and uses NetLogo platform to perform simulation analysis. In the simulation system, it is set that each subject can learn the strategy from two similar subjects.

This study compares and analyzes the similarities and differences in the effect of the punishment and reward–subsidy mechanisms on the level of tourism service, and explores what supervision methods and supervision intensity must be adopted by the government in the case of limited capital and budget to achieve the ideal result of quality service control (scenic spots provide high-quality service level, tourists do not complain, government supervision). This study does this by focusing on the impact of the government's punishment to the scenic spot, the scenic spot's compensation to tourists, the government's subsidy to the scenic spot, and the government's reward to tourists' complaints on the three-party evolutionary game behavior.

To control the influence of the initial will on the subject's strategy choice, the proportion of the initial strategy choice of the scenic spot, tourists, and the government is set as: x = 0. 5, y = 0. 5, z = 0. 5. The initial values of the basic parameters in the game matrix are shown in Table 2.

Table 2. Parameter Initial Values

Parameter	R_1	R_2	c_1	c_2	d_1	d_2	m_1	m_1'	m_2	m_2'	μ	t	X_1	X_2	g	ω
Initial Value	20	16	10	4	2	4	8	4	6	2	6	4	50	30	20	0.2

Results and Analysis of Three-Party Evolutionary Game Under Punishment Mechanism

Situation 1: The Influence of the Government's Punishment β on the Scenic Spots on Three-Party Evolutionary Game Behavior

The punishments β of 0.2, 0.5 and 0.8 represent the three levels of low, middle, and high, respectively. The results of the evolution game of the three parties under different penalty strengths are shown in Figures 4 through 6.

Figure 4. Evolution Trajectory of Scenic Spot Behavior Under Different Punishment Forces

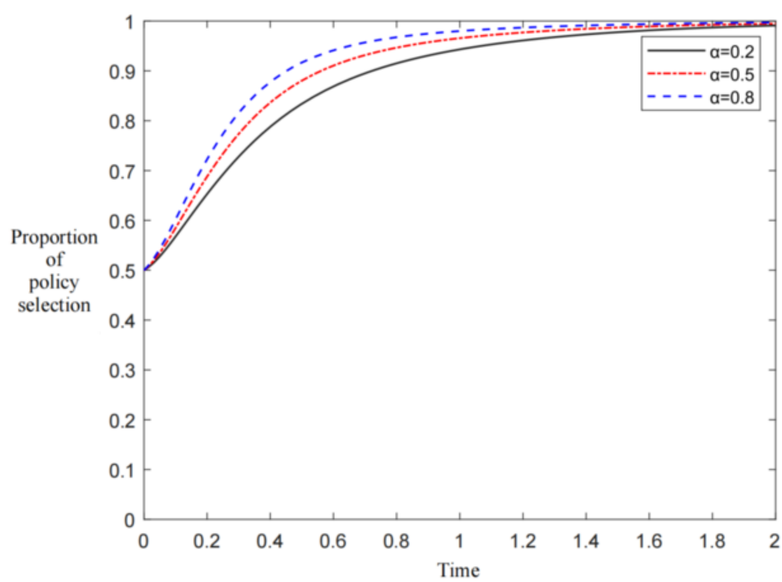


Figure 5. Evolution Trajectory of Tourist Behavior Under Different Punishment Forces

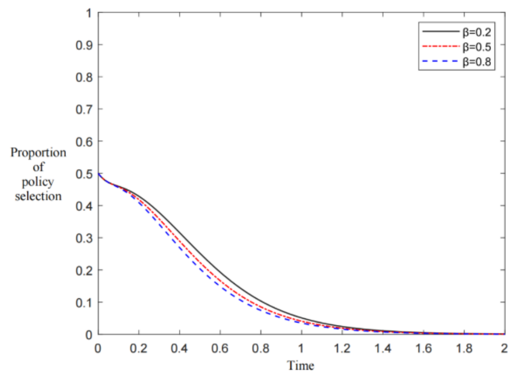
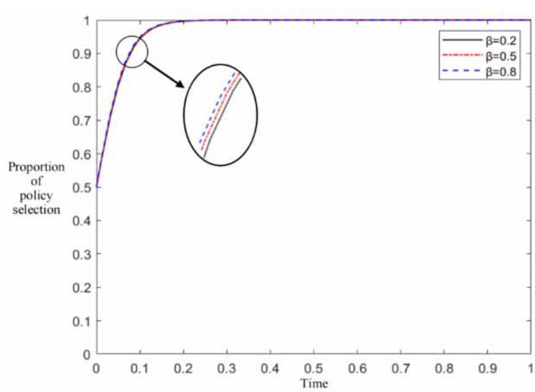


Figure 6. Evolution Trajectory of Government Behavior Under Different Punishment Forces



As shown in Figure 4, the greater the increase of the government's punishment on scenic spots, the faster the scenic spots provide high-quality services, indicating that only increasing the punishment can effectively improve the service level of scenic spots. However, in the long term, under different punishments, as time passes, the scenic spot will eventually tend to choose the strategy of providing a high-quality service level, which is also an inevitable requirement for the sustainable development of the scenic spot.

As shown in Figure 5, although tourists eventually evolve to not complain under three different punishments (high, medium, and low), it takes longer for tourists to evolve to not complain when the government adopts low punishments. In other words, tourists are more willing to complain when they visit scenic spots with relatively low service levels. However, in the case of medium to high punishment, tourists will gradually become disappointed with the increase of complaints and will not complain.

As shown in Figure 6, punishment intensity at low, medium, and high levels has little impact on government supervision. Basically, the government will evolve to strengthen supervision and take strong punishment measures.

In general, strengthening punishment can effectively reduce the phenomenon of low-quality service provided by scenic spots, reduce tourist complaints, and strengthen government supervision. Among the three punishment intensities, high punishment intensity can arouse the enthusiasm of scenic spots to provide high-quality services, tourists' complaints, and government supervision.

Punishment itself is not the goal of government supervision. According to the existing problems in the scenic spot, it should be reduced, mitigated, or not punished at all. It should guide the scenic spot to take the initiative to eliminate the impact or reduce the loss of tourists, help the scenic spot to improve its service quality, reform, and better play the role of education guidance of punishment.

Situation 2: The Influence of the Scenic Spot's Compensation for Tourists α on Three-Party Evolutionary Game Behavior

The government will ask the scenic spots to compensate the tourists after punishing the scenic spots, which is another form of punishment measure. The selected values α of this paper are 0.2, 0.5, and 0.8, which, respectively, represent the compensation levels of low, middle, and high tourists adopted by the scenic spot. The results of the evolution game of the three parties under different compensation strengths are shown in Figures 7 through 9.

Figure 7. Evolution Trajectory of Scenic Spot Behavior Under Different Compensation Intensities

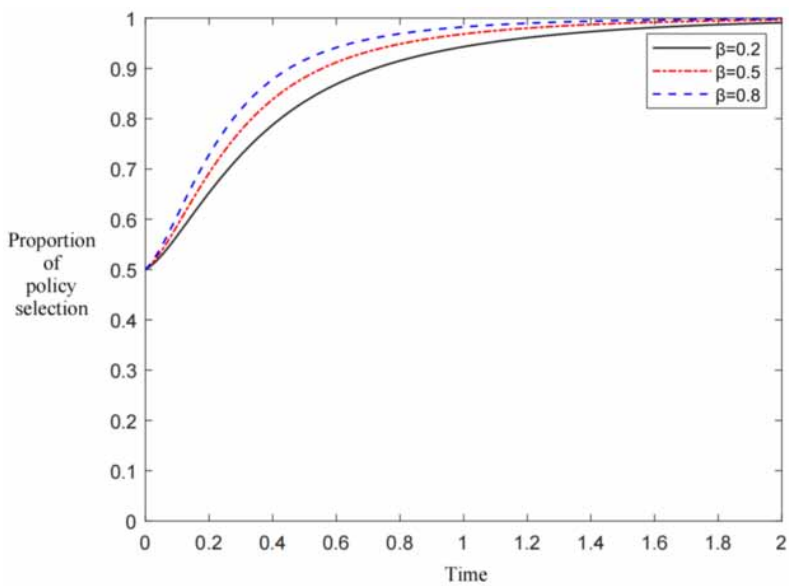


Figure 8. Evolution Trajectory of Tourist Behavior Under Different Compensation Intensities

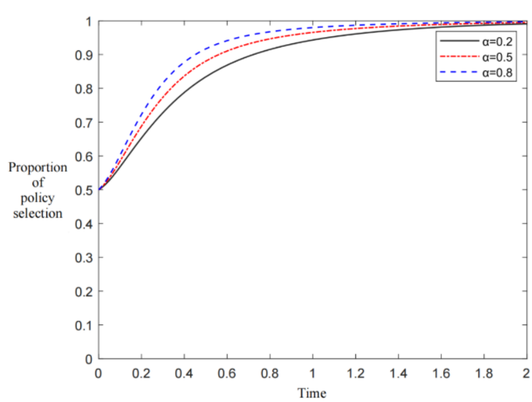
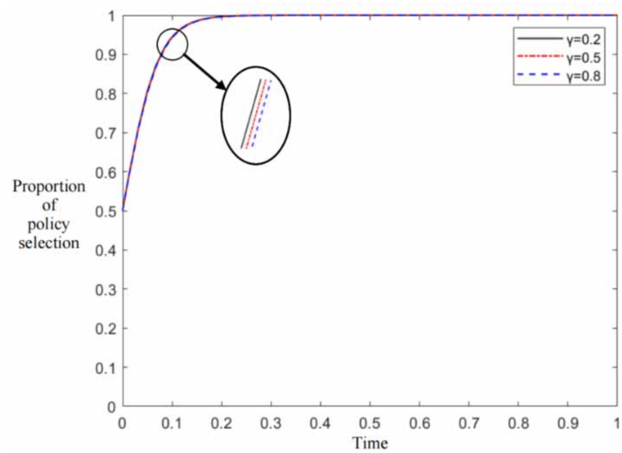


Figure 9. Evolution Trajectory of Government Behavior Under Different Compensation Intensities



As shown in Figure 7, with the increase of compensation efforts to tourists, the scenic spots evolve to provide low-quality services more quickly. However, in the end, almost all scenic spots choose to provide high-quality services, indicating that increasing compensation efforts can also effectively reduce the phenomenon of low-quality services provided by scenic spots. In Figure 8, under the three different subsidy levels of high, medium, and low, tourists eventually evolve to not complain. At this time, under the high subsidy level, it takes longer for tourists to evolve to not complain. That is, tourists are more willing to complain when the compensation level is higher. As shown in Figure 9, under the three different subsidy intensities of high, medium, and low, the government eventually evolves into the strategy of strengthening supervision. At this time, the government can improve its regulatory willingness more under the low subsidy intensities.

By comparing and analyzing the influence of punishment intensity and compensation intensity on the trend of the three-party evolutionary game, when the compensation intensity and punishment intensity are the same, so is the selection strategy trend of scenic spots. This is because both the government's punishment intensity and subsidy intensity to tourists are enormous losses for scenic spots. Under high compensation and punishment, scenic spots tend to provide high-quality services, thus for both tourists and the government, the evolution trend of high punishment intensity is faster than medium and low punishment intensities, and the evolution trend of low compensation intensity is faster than medium and high compensation intensities. From the evolution trajectory of the three parties, in general, among the three kinds of compensation intensity, high compensation intensity has the best effect on inhibiting and reducing the low-quality service provided by scenic spots, promoting tourist complaints and government supervision.

The compensation of scenic spots for tourists is a remedial measure after the event. To some extent, it will restore the image of the scenic spots in the minds of tourists, but this is not the best way to deal with this matter. The scenic spots must reduce the occurrence of service quality problems, because compensation also increases the cost burden of the scenic spots to some extent, which is ultimately not conducive to the long-term development of the scenic spots.

Results and Analysis of Three-Party Evolutionary Game Under the Reward–Subsidy Mechanism

To further explore the influence of the reward-subsidy mechanism on the evolution trend and evolution results, under the comprehensive consideration of the regulatory effect and government expenditure, first the penalty intensity and high compensation intensity are set, then the influence of subsidy intensity and reward intensity on the three-party evolution game is successively discussed.

Situation 3: The Influence of Government Subsidies to Scenic Spots ¸ on Three-Party Evolutionary Game Behavior

Each regional government calculates the local subsidy in different ways, but it will not exceed the local subsidy $\left(c_1 - c_2\right)$. Therefore, the upper limit of subsidy S is set at 6, θ of 0. 2, 0. 5, 0. 8 are the government's low, medium, and high subsidies at the three different levels. The results of the evolutionary game of the three parties under different subsidy forces are shown in Figures 10 through 12.

Figure 10. Evolution Trajectory of Scenic Spot Behavior Under Different Subsidies

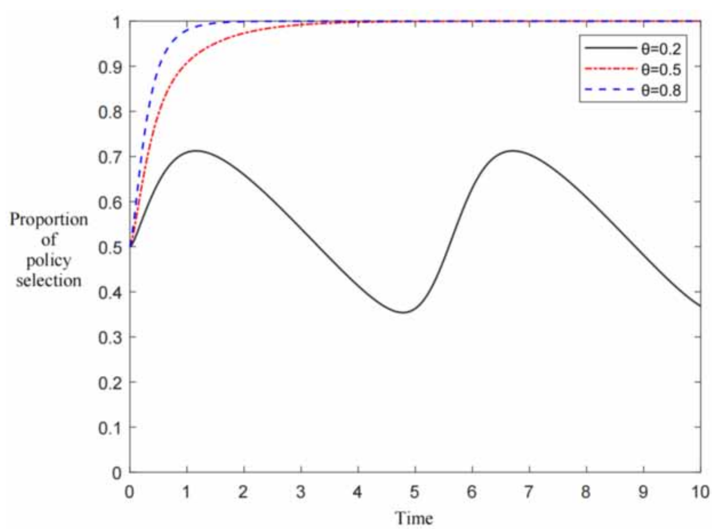


Figure 11. Evolution Trajectory of Tourist Behavior Under Different Subsidies

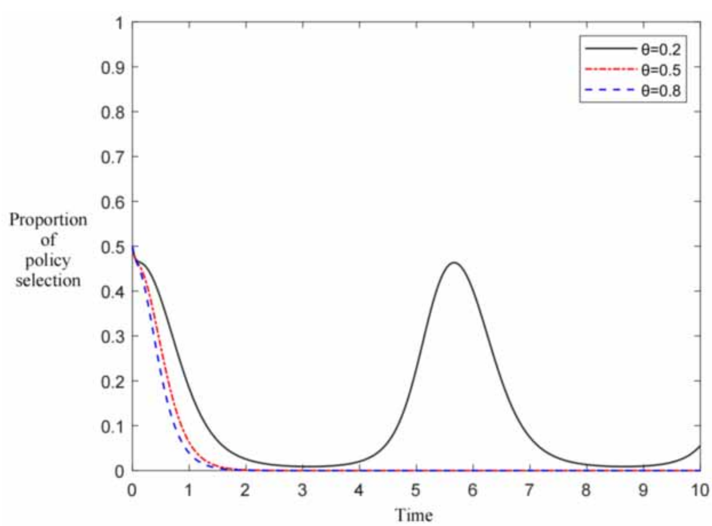
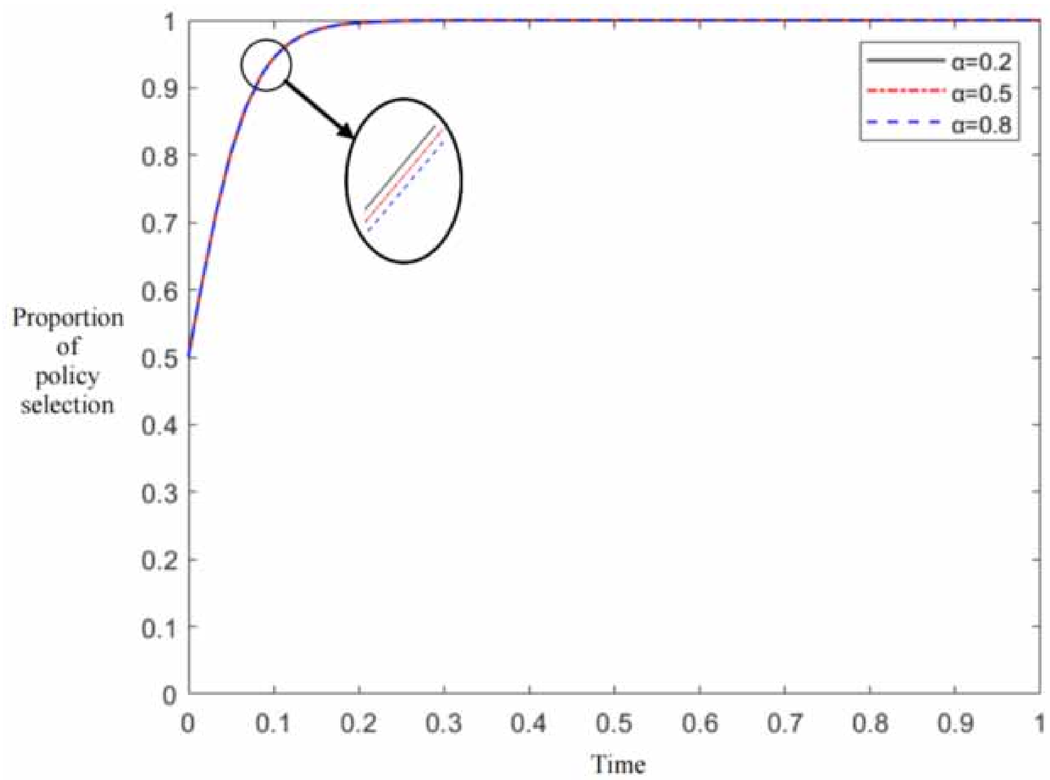


Figure 12. The Evolutionary Trajectory of Government Behavior Under Different Subsidies



As shown in Figure 10, when the government's subsidy is very low, the scenic spot's strategy selection fluctuates. In the initial stage, it tends to provide high-quality service, but when it reaches a certain stage, the willingness to provide high-quality service will gradually decrease, and the scenic spot begins to provide low-quality service, then continues this cycle, from providing high-quality service to low-quality service. Next, it continues to evolve to provide high-quality service, then to provide low-quality service once again. This indicates that low subsidy intensity cannot effectively change the service level selection strategy of scenic spots, nor can low subsidy amounts make scenic spots better bear the cost of high-quality service, and consequently they will alternate between providing high- and low-quality service strategies. When the government provides a moderate or high level of subsidy, then scenic spots gradually tend to provide high-quality service, and the higher the subsidy, the faster the evolution of high-quality service.

As shown in Figure 11, when the subsidy provided by the government is low, the tourists' willingness to complain gradually decreases at the beginning, and no complaint strategy is adopted. However, as time passes, the tourists' willingness to complain will continue to rise, but the highest proportion of complaints only reaches 50%, then gradually evolves to no complaint, which is related to the decision-making strategy adopted by the scenic spot. It can be seen from Figure 10 that when the scenic spot provides high-quality service, tourists will not complain, but when the scenic spot provides low-quality service, tourists will complain more strongly, and tourists' strategy selection is consistent with the strategy selection of the scenic spot.

As shown in Figure 12, under the three different subsidy levels of high, medium, and low, the government eventually evolves into the strategy of strengthening supervision. At this time, the government can improve its regulatory willingness more under the low subsidy level. Scenic spot subsidy is an expenditure for the government. When the government adopts low subsidy intensity, the government expenditure is lower, which shows active supervision. When the government adopts moderate subsidy, the government expenditure increases, but it is within the affordable range, and eventually it still evolves into regulation. When the government adopts the subsidy intensity, the government changes to no regulation at a relatively high speed. It can be seen that the greater the subsidy, the lower the government's willingness to choose regulation.

To encourage scenic spots to provide more high-quality tourism service products, the government will offer corresponding subsidies to eligible scenic spots to guide a greater number of scenic spots to participate in creating a good tourism environment. In addition, government subsidies can effectively reduce the operating costs of scenic spots, reduce tourists' admission ticket consumption, and stimulate more consumption.

Situation 4: The Influence of the Government's Reward γ for Tourist Complaints on Three-Party Evolutionary Game Behavior

The government's rewards for complaints from tourists are usually less than the subsidies to local reception agencies. The reward limit J is currently set at 3, with 0. 2, 0. 5, and 0. 8, respectively, indicating low, medium, and high rewards.

Figure 13. Evolution Trajectory of Scenic Spot Behavior Under Different Reward Intensities

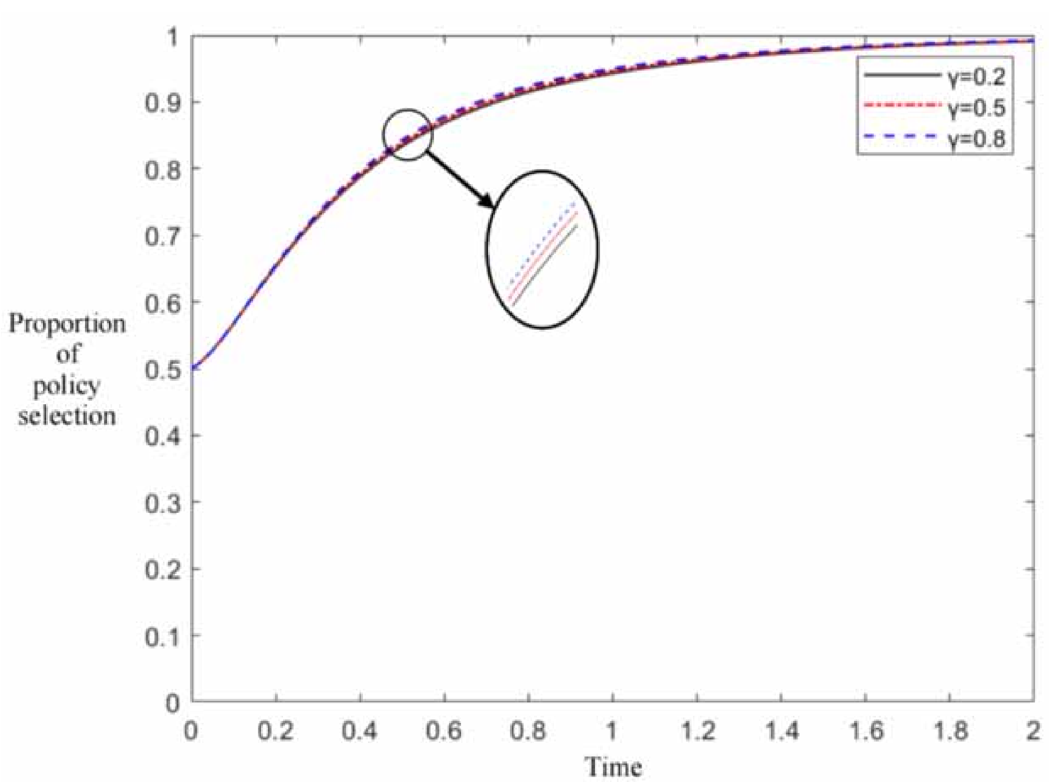


Figure 14. Evolution Trajectory of Tourist Behavior Under Different Reward Intensities

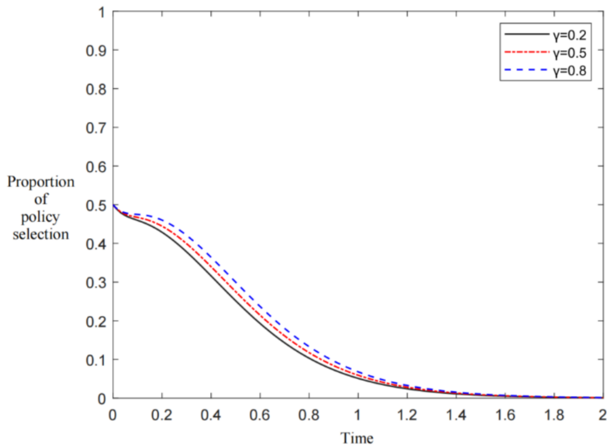
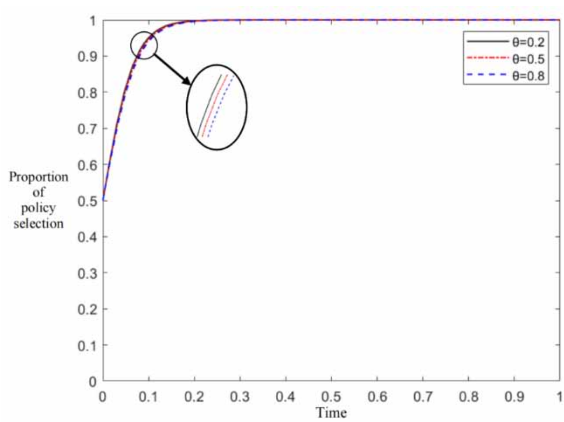


Figure 15. Evolution Trajectory of Government Behavior Under Different Reward Intensities



With the increase of the reward for tourists' complaints, the evolution speed of scenic spots to provide high-quality services is increasing. In Figure 14, as the reward strength of tourists' complaints continues to increase, tourists' willingness to complain gradually decreases, which is because the high reward strength cannot mobilize the enthusiasm of tourists to complain. Since the reward for tourists' complaints increases, the scenic spots dare not provide low-quality services, so that tourists are satisfied with the services they receive. At the same time, tourists will only complain when there is a certain proportion that makes tourists believe that the benefits after complaining exceed the expenses.

As can be seen from Figure 13 and 15, under the three different reward intensities of high, medium, and low, the government eventually evolved into the strategy of strengthening supervision. At this time, the government could improve its supervision willingness more under the low reward intensities. However, as the reward continued to increase, the financial burden of the government also increased, the speed of the government's evolution into supervision and regulatory enthusiasm both decreased.

The system of complaints and rewards is an effective measure by which to optimize the tourism market environment. By mobilizing the enthusiasm of tourists to participate, it can help the government disclose more scenic spots that do not conform to the norms, and punish them accordingly, thus improving the efficiency of government tourism supervision and law enforcement.

CONCLUSION

The service level and quality of scenic spots will affect the consumption experience of tourists, and it is difficult for the government to regulate the service level of scenic spots. In this paper, under the premise of limited ideal of the players, a dynamic game model of three-party evolution of scenic spots, tourists, and government, was constructed. Based on the comparison of punishment mechanism and reward mechanism, the influences of punishment intensity, compensation intensity, subsidy intensity, and reward intensity on the three-party evolutionary game behavior were discussed in the simulation section. The results reveal the following:

1. Under the punishment mechanism and reward-subsidy mechanism, the service strategy selection of scenic spots eventually evolves to provide high-quality services. Under the punishment mechanism, the higher the punishment and compensation intensities are, the greater the evolution speed of scenic spot selection to provide high-quality service. Under the reward-subsidy mechanism, the lower the subsidy and reward intensity are, the greater the evolution of scenic spots to provide high-quality services.
2. Under the punishment mechanism and reward and supplement mechanism, tourists' complaint strategy will eventually evolve into a non-complaint strategy. The higher the punishment and subsidy, the faster the non-complaint strategy will evolve. On the contrary, when the compensation intensity and reward intensity are lower, the evolution speed of the non-complaint strategy is higher.
3. Under the punishment and reward–subsidy mechanisms, the government's regulatory strategy eventually evolved into active regulation. Under the different intensities of punishment, compensation, subsidy, and reward, the government's active regulation evolved at different speeds. The higher the degree of punishment, the faster the evolution of government's active regulation. On the contrary, the degrees of compensation, subsidy, and reward were all low.

For scenic spots, tourists, and governments, their choice of game strategies depends on their own interests. The research results of this paper show that as time passes, no matter whether the initial choice of scenic spots is to provide tourism products with low-service quality or high-quality tourism products, they will ultimately choose to provide products with high-service quality under different influencing factors, which is the only means for the sustainable development of scenic spots. Any opportunistic or inferior behavior cannot be developed for a long time. Similarly, tourists needed to complain in the early stage because there were many problems in the scenic area. However, with the continuous improvement of the service quality of the scenic area, the opportunities for tourists to complain decreased, eventually resulting in no complaints. For the government, the responsible government will actively supervise the tourism market, and the level of supervision will also affect the creation of the tourism market environment. It must be emphasized that the government's supervision must be within the appropriate scope, so as to avoid the phenomenon of "too much is not enough."

Previous studies on the quality of service supervision of scenic spots have shown that the government mainly adopted to increase the intensity of punishment and implement punishment and supervision measures to reduce the phenomenon of low-quality service in scenic spots, but this supervision mode could not change the strategy of service provision in scenic spots. Due to the concealment of service provision in scenic spots, it is very difficult for the government to supervise them, and scenic spots still prefer to provide low-quality service even when the cost is uncontrollable. In this paper, the reward–supplement mechanism was added based on the punishment mechanism. Then, through the three-party game strategy of scenic spot, tourists, and government, the supervision mode of scenic spot service under the participation of tourists was constructed, and the innovation was expanded based on previous research.

Although this paper studied the three-party evolutionary game of scenic spots, tourists, and government under the reward–subsidy and punishment mechanisms, there remain the following deficiencies: The tourism service chain has diverse subjects and complex process supervision. This paper only considers the three key subjects of scenic spots, tourists, and the government, while failing to consider the situation of other subjects, such as travel agencies, and this can be further expanded upon in the future. In addition, due to idle research conditions, the simulation values set in this paper refer to real cases, which can only reflect the general situation of the three-party game, but cannot fully show the strategy and evolution trend of the real three-party game.

ACKNOWLEDGMENT

We would like to express our gratitude to the editors and reviewers who worked on the original manuscript. The funding body will be acknowledged following peer review.

REFERENCES

Arbara, S., & D'Autilia, R. (2021). A population game model for the expansion of airbnb in the city of Venice. *Sustainability*, *13*(7), 3829. doi:10.3390/su13073829

Asero, V., Patti, S., & Skonieczny, S. (2017). Cooperative optimization of tourism networks: An application of a game theory model. In *Handbook of research on holistic optimization techniques in the hospitality, tourism, and travel industry* (pp. 348–364). IGI Global. doi:10.4018/978-1-5225-1054-3.ch016

Baggio, R., Scott, N., & Cooper, C. (2010). Improving tourism destination governance: A complexity science approach. *Tourism Review*, *65*(4), 51–60. doi:10.1108/16605371011093863

Barari, S., Agarwal, G., Zhang, W. C., Mahanty, B., & Tiwari, M. K. (2012). A decision framework for the analysis of green supply chain contracts: An evolutionary game approach. *Expert Systems with Applications*, *39*(3), 2965–2976. doi:10.1016/j.eswa.2011.08.158

Blanco, E., Lozano, J., & Rey-Maquieira, J. (2009). A dynamic approach to voluntary environmental contributions in tourism. *Ecological Economics*, *69*(1), 104–114. doi:10.1016/j.ecolecon.2009.07.012

Chang, K. C., & Seow, Y. M. (2019). Protective measures and security policy non-compliance intention: It vision conflict as a moderator. *Journal of Organizational and End User Computing*, *31*(1), 1–21. doi:10.4018/JOEUC.2019010101

Chica, M., Hernández, J. M., & Perc, M. (2022). Sustainability in tourism determined by an asymmetric game with mobility. *Journal of Cleaner Production*, *355*, 131662. doi:10.1016/j.jclepro.2022.131662

Cristofaro, M., Leoni, L., & Baiocco, S. (2020). Promoting co-evolutionary adaptations for sustainable tourism: The "alpine convention" case. *Tourism Planning & Development*, *17*(3), 275–294. doi:10.1080/21568316.2019.1600162

Dai, Y. D., Zhuang, W. L., & Huan, T. C. (2019). Engage or quit? The moderating role of abusive supervision between resilience, intention to leave and work engagement. *Tourism Management*, *70*, 69–77. doi:10.1016/j.tourman.2018.07.014

Gang, Z., & Chenglin, L. (2021). Dynamic measurement and evaluation of hotel customer satisfaction through sentiment analysis on online reviews. *Journal of Organizational and End User Computing*, *33*(6), 1–27. doi:10.4018/JOEUC.20211101.oa8

He, P., He, Y., & Xu, F. (2018). Evolutionary analysis of sustainable tourism. *Annals of Tourism Research*, *69*, 76–89. doi:10.1016/j.annals.2018.02.002

Huang, H. Y., Wei, H. X., & Wei, M. (2019). Dynamic performance assessment system for Green tourism supply chain. *Tourism Analysis*, *24*(4), 467–482. doi:10.3727/108354219X15652651367479

Lv, W. Q., Wang, Y. J., Su, C. H. J., Chen, M. H., & Kot, H. W. (2022). A comprehensive analysis of package tour quality: A stochastic evolutionary game. *Tourism Management*, *91*, 104478. doi:10.1016/j.tourman.2021.104478

Ma, T., & Ding, F. (2018). Research on the dynamic effect of the intelligent urban experience to the tourists' two-way Internet word-of-mouth. *International Journal of Communication Systems*, *31*(16), e3467. doi:10.1002/dac.3467

Mariani, M. M., Buhalis, D., Longhi, C., & Vitouladiti, O. (2014). Managing change in tourism destinations: Key issues and current trends. *Journal of Destination Marketing & Management*, *2*(4), 269–272. doi:10.1016/j.jdmm.2013.11.003

Ng, C. Y., Law, K. M., & Ip, A. W. (2021). Assessing public opinions of products through sentiment analysis: Product satisfaction assessment by sentiment analysis. *Journal of Organizational and End User Computing*, *33*(4), 125–141. doi:10.4018/JOEUC.20210701.oa6

Pastras, P., & Bramwell, B. (2013). A strategic-relational approach to tourism policy. *Annals of Tourism Research*, *43*, 390–414. doi:10.1016/j.annals.2013.06.009

Podhorodecka, K., & Cobb, S. C. (2019). Development of sustainable tourism in Malta in the aftermath of the global economic recession. *Problemy Zarzadzania*, *1*(81), 159–178.

Qingyun, P., & Mu, Z. (2021). Evolutionary game analysis of land income distribution in tourism development. *Tourism Economics*, *27*(4), 670–687. doi:10.1177/1354816619898078

Şeremet, M., Haigh, M., & Cihangir, E. (2021). Fostering constructive thinking about the 'wicked problems' of team-work and decision-making in tourism and geography. *Journal of Geography in Higher Education*, *45*(4), 517–537. doi:10.1080/03098265.2020.1869924

Sun, K., Xing, Z., Cao, X., & Li, W. (2021). The regime of rural ecotourism stakeholders in poverty-stricken areas of China: Implications for Rural Revitalization. *International Journal of Environmental Research and Public Health*, *18*(18), 9690. doi:10.3390/ijerph18189690 PMID:34574612

Sun, Y., Liu, B., Fan, J., & Qiao, Q. (2021). The multi-player evolutionary game analysis for the protective development of ecotourism. *Environmental Science & Policy*, *126*, 111–121. doi:10.1016/j.envsci.2021.09.026

Theodoulidis, B., Diaz, D., Crotto, F., & Rancati, E. (2017). Exploring corporate social responsibility and financial performance through stakeholder theory in the tourism industries. *Tourism Management*, *62*, 173–188. doi:10.1016/j.tourman.2017.03.018

Todd, L., Leask, A., & Ensor, J. (2017). Understanding primary stakeholders' multiple roles in hallmark event tourism management. *Tourism Management*, *59*, 494–509. doi:10.1016/j.tourman.2016.09.010

Tsaur, R. C., & Chen, C. H. (2018). Strategies for cross-border travel supply chains: Gaming Chinese group tours to Taiwan. *Tourism Management*, *64*, 154–169. doi:10.1016/j.tourman.2017.08.011

Waligo, V. M., Clarke, J., & Hawkins, R. (2015). Embedding stakeholders in sustainable tourism strategies. *Annals of Tourism Research*, *55*, 90–93. doi:10.1016/j.annals.2015.09.002

Wang, W., & Wu, D. (2022). Construction of Rural Tourism Brand Value Management Model from the Perspective of Big Data. *Computational Intelligence and Neuroscience*, *2022*, 2022. doi:10.1155/2022/5623782 PMID:35909864

Wang, Y., Zhou, M., Zhu, H., & Wu, X. (2022). The impact of abusive supervision differentiation on team performance in team competitive climates. *Personnel Review*. Advance online publication. doi:10.1108/PR-04-2021-0281

Xu, Z. Z., Wang, Y. S., Teng, Z. R., Zhong, C. Q., & Teng, H. F. (2015). Low-carbon product multi-objective optimization design for meeting requirements of enterprise, user and government. *Journal of Cleaner Production*, *103*, 747–758. doi:10.1016/j.jclepro.2014.07.067

Yan, H., Wei, H., & Wei, M. (2021). Exploring tourism recovery in the post-COVID-19 period: An evolutionary game theory approach. *Sustainability*, *13*(16), 9162. doi:10.3390/su13169162

Zhang, H., & Yang, Y. (2019). Prescribing for the tourism-induced Dutch disease: A DSGE analysis of subsidy policies. *Tourism Economics*, *25*(6), 942–963. doi:10.1177/1354816618813046

Zhang, J., & Zhang, Y. (2020). Assessing the low-carbon tourism in the tourism-based urban destinations. *Journal of Cleaner Production*, *276*, 124303. doi:10.1016/j.jclepro.2020.124303

Zhao, L., & Chen, L. (2022). Research on the impact of government environmental information disclosure on green total factor productivity: Empirical experience from Chinese province. *International Journal of Environmental Research and Public Health*, *19*(2), 729. doi:10.3390/ijerph19020729 PMID:35055551

Zhao, R., Chen, Q., Kong, D., & Song, Y. (2022). Forest tourism development conflict analysis under carbon peak and neutrality goals—Based on graph model for conflict resolution. *Frontiers in Environmental Science*, *10*, 918389. doi:10.3389/fenvs.2022.918389